

# A New Record of Sea Star (Asteroidea: Valvatida) from Korea

Jeoung Hee Lee and Sook Shin\*

Department of Life Science, Sahmyook University, Seoul 139-742, Korea

## ABSTRACT

A asteroid species, *Pentaceraster regulus* (Müller and Troschel, 1842), was collected by SCUBA diving in Seogwipo, Jeju Island on August 2008, and reported herein as new to Korea. Diagnostic description and digital images of the species were provided.

**Key words:** Oreasteridae, *Pentaceraster*, Jeju Island, Korea

## INTRODUCTION

The asteroids are one of the most diverse and familiar living echinoderms from every ocean and have been reported to have approximately 1,800 species inhabiting every ocean basin in the world from intertidal to 6,000 m abyssal settings (Mah, 2009). Since the first report by Sladen (1879), 50 asteroid species have so far been reported from South Korea (Rho and Kim, 1966; Rho and Shin, 1980; Shin, 1992, 1995, 2000, 2007). Of these, 22 species have been reported in Jeju Island, and especially nine species of which have been known to occur only in the area of Jeju Island (Shin and Rho, 1996; Shin, 2000, 2007).

In our last August SCUBA diving survey in Munseom Island (Seogwipo, Jeju Island, Korea) at 15-20 m deep, we found unusual samples, and recently identified it as *Pentaceraster regulus* (Müller and Troschel, 1842) belonging to family Oreasteridae of order Valvatida. Family Oreasteridae and genus *Pentaceraster* are new to Korea. In this study, we report the species together with diagnostic description complemented by digital images using stereomicroscope and light microscope. Samples used in this study were preserved in 95% ethyl alcohol, and housed at the department of Life Science, Sahmyook University.

## SYSTEMATIC ACCOUNTS

Phylum Echinodermata Klein, 1734  
Class Asteroidea de Blainville, 1830

\*To whom correspondence should be addressed  
Tel: 82-2-3399-1717, Fax: 82-2-3399-1729  
E-mail: shins@syu.ac.kr

Order Valvatida Perrier, 1884

<sup>1</sup>\*Family Oreasteridae Fisher, 1911

Body markedly convex above, often highest at five rows of caninal plates, each of which may be crowned by high tubercles.

<sup>2</sup>\*Genus *Pentaceraster* Döderlein, 1916

Carinal plates more or less convex or with tubercles, and some distal inferomarginal plates usually with enlarged projections.

Type species: *Pentaceraster mamillatus* (Audouin, 1826).

<sup>3</sup>\**Pentaceraster regulus* (Müller & Troschel, 1842)  
(Fig. 1A-N)

*Oreaster regulus* Müller & Troschel, 1842, p. 51.

*Pentaceros regulus* Sladen, 1889, p. 762.

*Oreaster doederleini* Goto, 1914, p. 451.

*Pentaceraster regulus*: Döderlein, 1936, p. 56; Clark & Rowe, 1971, p. 55; Gibbs et al., 1976, p. 115.

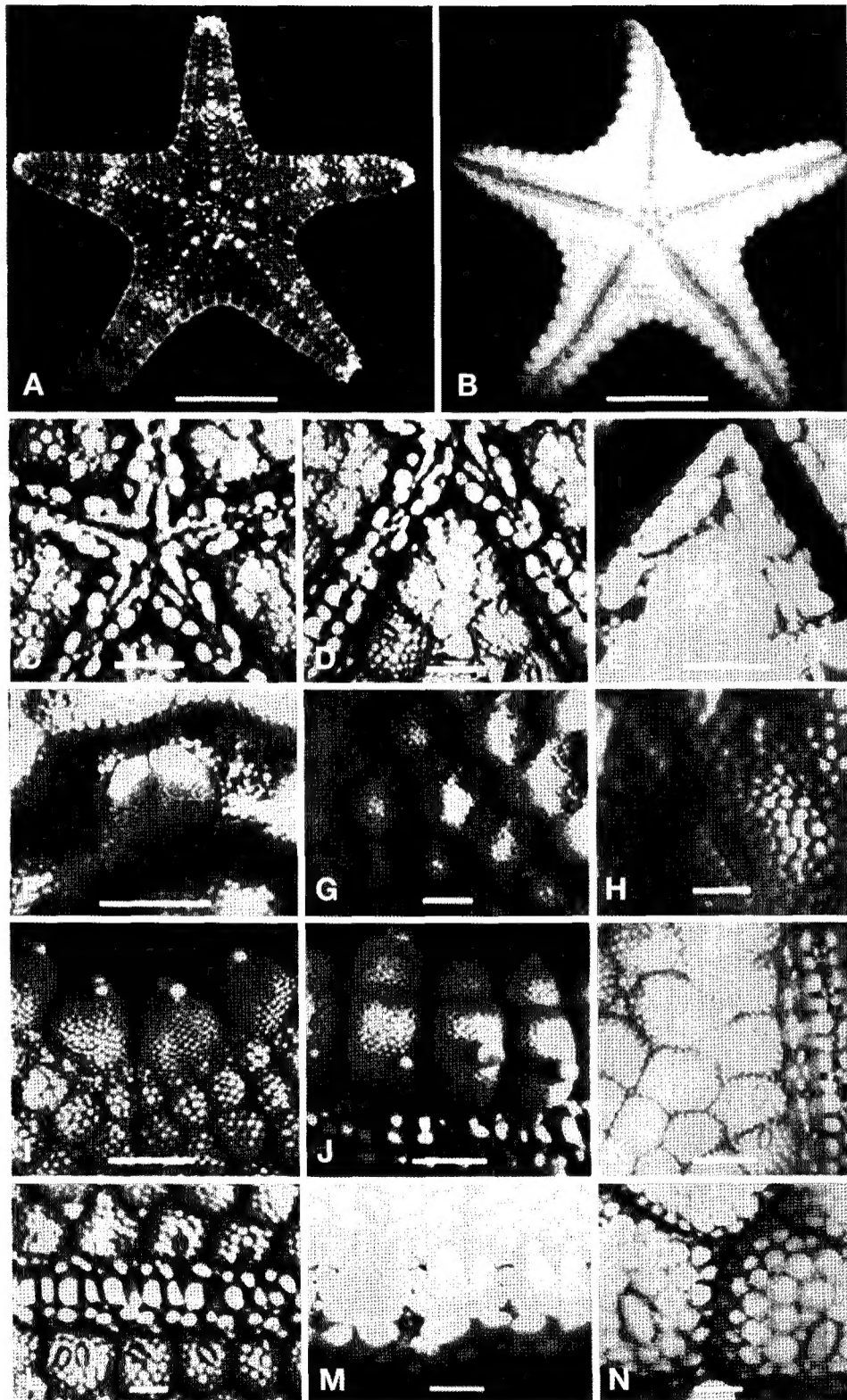
*Pentaceraster regulus cebuana* Döderlein, 1936, p. 352; Hayashi, 1938, p. 205.

*Oreaster australis*: Clark, 1946, p. 107; Endean, 1953, p. 54.

**Material examined.** Munseom, Jeju Island, 19 Aug. 2008. 4 specimens, 15-20 m deep water. by SCUBA diving (Lee J.H. and T.J. Lee).

**Description.** R=50-61 mm, r=18-24 mm, R=2.5-2.8r. Arms five in number, bent upwards at tips, and nearly triangular in cross section. Dorsal plates arranged in rows, parallel with lateral margins of arms, and covered with numerous fine granules, and each plate bear one to four valvate pedicellariae. In center of disk five large knobs of primary radial dorsal plates arranged in pentangular form. Smaller knobs on cari-

<sup>1</sup>\*오각불가사리과 (신칭), <sup>2</sup>\*오각불가사리속 (신칭), <sup>3</sup>\*오각관불가사리 (신칭)



**Fig. 1.** *Pentaceraster regulus*. A, dosal side; B, ventral side; C, D, oral part; E, oral plate; F, madreporite; G, dosal plates; H, valvate pedicellariae in dosal plate; I, tubercles on superomarginal plates; J, tubercles on inferomarginal plates; K, ventrolateral plates and adambulacral plates; L, adambulacral plates and spines; M, adambulacral spines; N, valvate pedicellariae in adambulacral plates. Scale bars=2.5 cm (A, B); 3 mm (C, D, G), 2 mm (E, F, I-M), 1 mm (H, N).

nal plates form a distinct series towards tip of arm. Madreporite comparatively large, conspicuous, more or less elliptical, and located near central pentagon form.

Marginal plates large, longer than wide and separated by narrow grooves. Superomarginal and inferomarginal plates closely covered with granules similar to those of dorsal plate, but become coarse ventrally and more like granules of adjacent ventrolateral plates. Superomarginal plates with slightly convex surface, 13 or 14 in number, large, rounded polygonal, and become more or less pentagonal on outline along arm. Each plate bears usually one or rarely two conical tubercles but tubercles of central part larger than rest ones, and with one or rarely two large valvate pedicellariae. Inferomarginal plates with one or rarely two very small pedicellaria, correspond to superomarginal plates along arms, but somewhat larger than corresponding superomarginal plates. Inferomarginal tubercles one or rarely two, larger and more conspicuous than superomarginal ones, and of which interbranchial ones smaller than those on side of arms, but ones near tips of arms much larger than others. Ventrolateral plates covered with numerous coarse granules and usually one or rarely two small pedicellariae, of which plates besides inferomarginal plates arranged in a regular row extending two thirds of arm length but second rows somewhat irregularly arranged extending one thirds of arm length.

Adambulacral plates nearly pentagonal forms and covered with numerous granules which become more dense towards oral plate, and bear usually one or two, sometimes three, large valvate pedicellariae. Adambulacral spines arranged in three rows. First adambulacral row spines consist of six to nine spines per plate, which small, straight and unequal length. Second row spine largest spines of these rows, and consists of usually two stout, flattened, blunt spines. Third row spines similar to second row spines in shape, but usually small, three or four, usually three in number, of which central spines wide, roundly cone shape, and both side spines very slim and short. Granules exactly like those of other plates, but become conspicuously dense toward to oral plate. Oral plates narrow and elongated, but indistinct on surface. Oral spines arranged in two rows. Inner row composed of 11-13 spines, of which four or five at oral end larger than rest. Outer row consists of seven or eight spines, but similar to larger spines of inner row.

**Distribution.** Korea (Jejudo Island), Japan (Ryukyu Is.), South Pacific, North Australia, Bay of Bengal, East Indies.

**Remarks.** This species was characterized by hard, thick and heavy body with flattened ventral side and convex dorsal side of disk and tapering arms. It had a regular pentagonal pattern consisting of five rounded knobs on the center of disk. As compared with description of *Oreaster doederleini* Goto, 1914 which revealed the synonym of this species by

Hayashi (1938), this species had smaller number of pedicellariae. Supermarginal plates and infermarginal plates of our samples rarely had pedicellariae. Body color was mainly dark brown, but two white stripes were on each arm in large specimens. Especially knobs forming pentangular shape on the disk were vermilion color, but this color turned white toward the tip of arm.

## ACKNOWLEDGEMENTS

This work was supported by Sahmyook University Research Fund in 2008 and partially by the project on survey and excavation of Korean indigenous species of the National Institute of Biological Resources (NIBR) under the Ministry of Environment, Korea.

## REFERENCES

- Clark, A.M. and F.W.E. Rowe, 1971. Monograph of shallow-water Indo-west Pacific Echinoderms. Trust. Brit. Mus. (Nat. Hist.), Lond., 690: 1-238.
- Clark, H.L., 1946. The echinoderm fauna of Australia. Its composition and its origin. Carnegie Inst. Wash. Pub., 566: 1-567.
- Döderlein, L., 1936. Die Asteriden der Siboga-Expedition. Die waterfamilie Oreasterinae. Siboga Exped., 46(c): 295-422.
- Endean, R., 1953. Queensland faunistic records. 3. Echinodermata (excluding Crinoidea). Pap. Dept. Zool. Univ. Qld., 1: 1-516.
- Gibbs, P.E., A.M. Clark and C.M. Clark, 1976. Echinoderms from the Northern Region of the Great Barrier Reef, Australia. Bull. Br. Mus. (Nat. Hist.) Zool., 30(4): 104-144.
- Goto, S., 1914. A Descriptive monograph of Japanese Asteroidea. J. Sci. Imp. Univ. Tokyo, 29(1): 1-808.
- Hayashi, R., 1938. Sea-stars of the Ryukyu Islands. Bull. Biog. Soc. Japan, 8(14): 197-221.
- Mah, C.L., 2009. World Asteroidea database. Available online at <http://www.marinespecies.org/asteroidea>.
- Müller, J. and F.H. Troschel, 1842. System der Asteriden Braunschweig, pp. 1-134. Cited from Sladen, 1889.
- Rho, B.J. and H.S. Kim, 1966. Studies on the Echinodermata (Echinoidea, Asteroidea and Ophiuroidea) from Korea. I. Coll. Thes. Writ. Commem. Dr. Emma Kim's Forty Tears Teac. Ewha Womans Univ., pp. 273-293.
- Rho, B.J. and S. Shin, 1980. A systematic study on the echinoderms in Korea. 4. Asteroids. J. Korean. Res. Inst. Better Liv., Ewha Womans Univ., 261: 65-104.
- Shin, S. and B.J. Rho, 1996. Illustrated Encyclopedia of Fauna and Flora of Korea. Vol. 36. Echinodermata. Min. Edu., Korea, pp. 1-780.
- Shin, S., 1992. A systematic study on the Asteroidea in Korea. I. Species from the South Sea. Korean J. Syst. Zool., 8(2):

- 243-258.
- Shin, S., 1995. A systematic study on the Asteroidea in the East Sea, Korea. *Korean J. Syst. Zool.*, 11(2): 243-263.
- Shin, S., 2000. New record of two Phanerozoonian asteroids (Echinodermata, Asteroidea) in Korea. *Korean J. Syst. Zool.*, 16(1): 23-30.
- Shin, S., 2007. A New record of sea star (Asteroidea: Phanerozonia) from Jeju Island, Korea. *Korean J. Syst. Zool.*, 23(2): 251-253.
- Sladen, W.P., 1879. On the Asteroidea and Echinoidea of the Korean Seas. *J. Linn. Soc. Lond.*, 14: 424-445.
- Sladen, W.P., 1889. Report on the Asteroidea collected during the voyage of H.M.S. Challenger, during the years 1873-1876. *Rep. Sci. Res. Voy. H.M.S. Chall., 1873-76, Zool.*, 30(51): 1-893.

Received October 22, 2009  
Accepted November 7, 2009